

## Claims

1. In an internal combustion engine system which operates on fuel and which has an auxiliary system which intermittently uses an internally generated mixture including hydrogen and carbon monoxide ("syngas", hereinafter), a method comprising:

5 generating in a reformer at least an amount of syngas adequate for said auxiliary system;

periodically applying said syngas to said auxiliary system in said adequate amount during first periods of time interspersed with second periods of time; and

10 during said second periods of time, either (a) reducing the amount of said syngas generated so as to generate no more than a small fraction of said adequate amount of syngas, (b) diverting said syngas to a fuel inlet of said engine, or (c) feeding a small amount of syngas generated by a continuously running mini CPO to said

15 reformer.

2. In an internal combustion engine system which operates on fuel and provides exhaust, having oxides of nitrogen ("NOx", hereinafter) therein, to an NOx trap assembly having an adsorption material which is periodically regenerated with an

5 internally generated mixture including hydrogen and carbon monoxide ("syngas", hereinafter) to said NOx trap, a method of providing syngas, comprising:

first, generating in a reformer syngas from said exhaust and said fuel in at least an amount effective to regenerate the adsorption

10 material in said NOx trap assembly;

second, periodically applying at least said effective amount of said syngas to said NOx trap assembly for first periods of time on the

order of 5-10 seconds long, interspersed with second periods of time which are about 8-20 times longer than said first periods of time; and

15           third, altering either said first step or said second step during said second periods by either (a) diverting said syngas from said NOx trap assembly to an inlet to said engine, (b) reducing the amount of said fuel and said exhaust used to generate said syngas, so as to generate no more than a small fraction of said effective amount of  
20           syngas, or (c) feeding a small amount of syngas generated by a continuously running mini CPO to said reformer.

3.       Apparatus for generating a mixture including hydrogen and carbon monoxide ("syngas", hereinafter), comprising:  
          an oxides-of-nitrogen ("NOx", hereinafter) trap assembly having an adsorption material which is periodically regenerated with  
5           syngas;

          an internal combustion engine system which operates on fuel and provides exhaust having NOx therein to said NOx trap assembly;

          first means for generating syngas from said exhaust and said fuel in an amount effective to regenerate the adsorption material in  
10           said NOx trap assembly;

          second means for periodically applying at least said effective amount of said syngas to said NOx trap assembly for first periods of time on the order of 5-10 seconds long, interspersed with second periods of time which are about 8-20 times longer than said first  
15           periods of time; and

          third means for altering the operation of either said first means or said second means during said second periods by either (a) diverting said syngas from said NOx trap assembly to an inlet of said engine, (b) reducing the amount of said fuel and said exhaust used to

20 generate said syngas so as to generate no more than a small fraction of said effective amount of syngas, or (c) feeding a small amount of syngas generated by a continuously running mini CPO to said reformer.

4. Apparatus according to claim 3 wherein:  
the adsorption material in said NOx trap assembly comprises barium carbonate.